product user guide

mabey hire
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Title	Issue	Date
Single Acting Manhole Brace	9	April 2014

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1. Introduction

Mabey Hire's Single Acting Manhole Brace system is intended to be used as a temporary waling system to sheeted excavations. The frames have 4 way adjustment, part mechanical and part hydraulic. It is not intended for other purposes.

Single Acting Manhole Brace **CANNOT** be used in conjunction with Mabey Hire's other frame systems - Double Acting Manhole Brace, Shaftbrace, Tankbrace or Super Shaftbrace.

This booklet provides basic information for users of Single Acting Manhole Brace to assist them in their preparation of a safe system of work on site. Single Acting Manhole Brace should **NOT** be used in seawater applications without prior consultation with Mabey Hire.

Refer to Appendix A for details of our site demonstrator service.

2. Design

Refer to the table on page 5 for information on allowable leg loads. Clients are strongly advised to ensure that a competent engineer is employed to provide a suitable design for excavation schemes requiring the use of Single Acting Manhole Brace products.

Mabey Hire Ltd offer a design service for excavation schemes.

3. Frame Dimensions

This booklet gives information for frame dimensions for Single Acting Manhole Brace Walings (See page 5 for details).

4. Adjustments

The Single Acting Manhole Brace system incorporates a mechanical and hydraulic system of adjustment which is designed to extend the frames under conditions of no or low loading: e.g. as when first installed.

Once they are sustaining significant ground loads, extension or retraction of the frames is inadvisable and is unlikely to be possible. Methods of working should therefore avoid the need for frame adjustment / removal whilst the walings are heavily loaded.

5. General Guidance Notes

5.1 Safe System of Work and Method Statement

Assuming that the location, plan size and depth of an excavation, together with an arrangement of sheets and frames has already been determined, the Health and Safety at Work Act requires that a safe system of work is adopted to carry out the work on site.

These guidance notes are intended to draw the client's attention to practical aspects of Single Acting Manhole Brace installation which need to be considered in compiling method statements for a safe system of work.

In particular, the client's attention is drawn to the lengths and weights of the frame members and the need for planning the lifting operations involved.

All major components of the Single Acting Manhole Brace system are fitted with lifting lugs for safe slinging.

The method of constructing a typical excavation using Single Acting Manhole Brace is given in Section 10.

5.2 Manpower

The Health and Safety legislation requires that personnel deployed are suitably trained, experienced and supervised by a competent person. All lifting operations are to be controlled by an appointed person in accordance with BS7121 and LOLER regulations.

The main activities associated with Single Acting Manhole Brace installation are:

- Unloading the delivery vehicle.
- Slinging and lifting walings into position in the excavation, carrying out mechanical adjustment of the waling if required and connecting the corners to form frames.
- Connecting the pump to each waling in turn, pressurizing the frames and fitting restraint chains.

5.3 Plant and Lifting

A suitable appliance is required for off-loading and installation. For off-loading there needs to be sufficient clearance under the main hook to allow lifting with a safe angle between the lifting slings.

If the walings are to be lifted into the excavation then the appliance should be located a safe distance from the edge of the excavation and the lifts and radii checked against the safe lifting capacities of the appliance.

In this booklet it is assumed that the frames will be lifted into the excavation fully assembled. Likewise for removal it is assumed that the frame will be removed fully assembled.

WARNING : If an excavator is being used for lifting operations, refer to safety information on page 4.

5.4 Small Plant, Tools and Lifting Chains for Handling

Essential equipment required is:

5.4.1 Sledgehammers for making pinned connections. (Not in Mabey Hire Supply).

5.4.2 Lifting chains of suitable length and capacity and with current certification. The walings have lifting lugs designed to take 10mm safety hooks.

5.4.3 In most cases the centre of gravity of the lifts involved will not be at mid-length so shortening clutches are advisable. Mabey Hire offer sets of 4 leg chains with 4.0m leg length c/w shortening clutches and safety hooks (Code : PSP-155/SH, weight 24kg) though clients should check that the leg length is suitable to use with their lifting appliance.

5.5 Edge Protection, Access and Hard Standing Areas

These include:-

- Suitable area to off-load the lorry and assemble the walings.
- Suitable hard standings for the lifting appliance to operate from if it is intended to lift the walings into the excavation.
- Ladders and possibly other provisions to provide safe access into the excavation to install restraint chains and connect pump hoses.
- Edge protection, ladders and possibly other provisions to provide safe access into and out of the excavation. (Edge protection and ladder access platforms can be supplied by Mabey Hire Ltd).

5.6 During Excavation Works on Site

If Mabey Hire Ltd have designed the sheeting and frame arrangement for the excavation they will have used ground data provided by the client.

If during the excavation it is noted that the actual ground conditions and / or ground water levels differ from those provided at design stage it is advisable to have the scheme rechecked.

5.7 After Excavation Works are Completed

Plan for edge protection to be installed as early as possible.
Regularly inspect the excavation for signs of excessive movements of sheets or walings.
Check the hydraulic walings for signs of fluid leakage.
Keep plant, spoil heaps and stored materials well clear from the edge of the excavation.

5.8 Return of Equipment off Hire

Clients should ensure that on removal, the equipment is returned clean in lengths as supplied.

5.9 Transportation

Ensure that the Manhole Brace Rams are fully retracted prior to loading and that the legs are stacked on the lorry as figure 1 in section 8. Ensure all equipment is loaded to the satisfaction of the lorry driver and is securely restrained to the vehicle bed. The installation kit is transported and stored in a stillage.

5.10 References

5.10.1 Legislation

The Health & Safety at Work Act 1974
The Management of Health and Safety at Work Regs (M.H.S.W.) 1999
The Construction (Design and Management) Regulations 2007
The Control of Substances Hazardous to Health (COSHH) Regulations 1994
The Lifting Operations and Lifting Equipment Regulations (LOLER) 1998
The Provision and Use of Work Equipment Regulations (PUWER) 1998
Work at Height Regulations 2005
Noise
Manual Handling

5.10.2 HSE Guidance

Health and Safety in Construction (HSG150 - rev)
A Guide to Managing Health and Safety in Construction (ISBN 0 7176 0755 0)
Health and Safety in Excavations - Be Safe and Shore (HSG185)
Safe Work in Confined Spaces - Regulations, Approved Code of Practice and Guidance (L101)
Five Steps to Risk Assessment (INDG 163)
Excavators Used as Cranes - Guidance Note PM42

5.10.3 Other Guidance

CPA Guidance	Safety in Shoring - The Proprietary Shoring and Piling Equipment Manual
CPA (STIG) Guidance	STIG 0201 : Selection of Proprietary Shoring Equipment
CPA (STIG) Guidance	TIN 203 : The Use of Restraining Chains to Support Shoring Equipment
CPA (STIG) Guidance	TIN 204 : The Correct Use of Lifting and Other Attachment Points for Shoring Equipment
CPA Safety Guidance	Risk Assessment (SG 003)
CPA Guide Ref No. SG001(3)	Guidance on Lifting Operations in Construction When Using Excavators
CIRIA Report R166	CDM Regulations - Work Sector Guidance for Designers
CIRIA Report 97	Trenching Practice
CIRIA Special Publication 131	Crane Stability on Site
CIRIA Special Publication 95	The Design and Construction of Sheet-Piled Cofferdams

5.10.4 British and European Standards

BS 6031 : 2009 Code of Practice for Earthworks
BS EN 996 : 1996 Piling Equipment. Safety Requirements
BS EN 1997-1 : 2004 Code of Practice for Foundations
BS 5228-1 : 2009 Code of Practice for Noise and Vibration Control on Construction and Open Sites : Noise
BS 5228-2 : 2009 Code of Practice for Noise and Vibration Control on Construction and Open Sites : Vibration

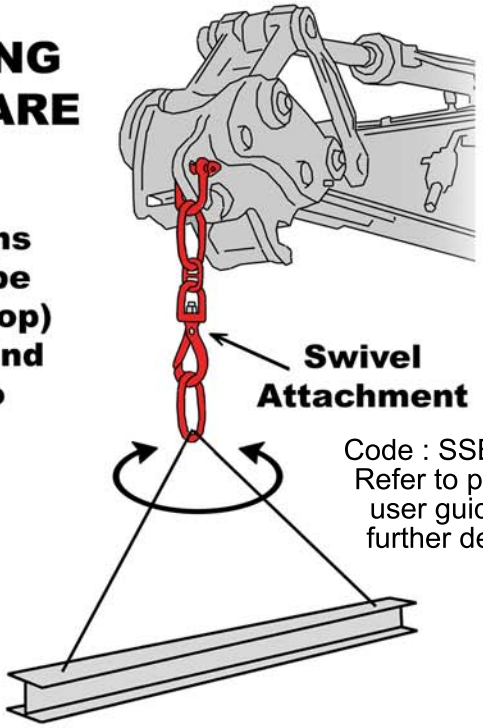
6. Sling Warning

WARNING

IF YOU ARE USING A SLING ON AN EXCAVATOR BEWARE THE FOLLOWING :-

It is very important that a means of allowing the sling to swivel be introduced above the master (top) ring. This will allow the sling, and in particular the master ring, to turn and align with the load.

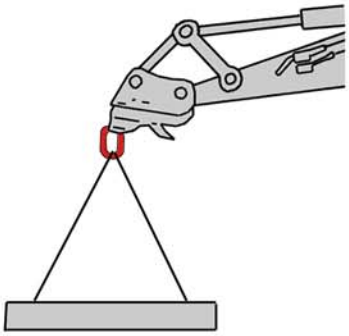
WITHOUT A SWIVEL ARRANGEMENT THE LOAD MAY SEVERELY TWIST THE MASTER RING RESULTING IN DAMAGE OR FAILURE.



Code : SSBA-007
Refer to product user guide for further details.

All lifting accessories attached to the excavator lifting point must hang freely and be free to move at all times.

TILTING THE HEAD OF THE DIPPER ARM / QUICK HITCH UPWARDS MAY PREVENT FREEDOM OF MOVEMENT AND SO TWIST, DAMAGE OR FAIL THE LIFTING EQUIPMENT.



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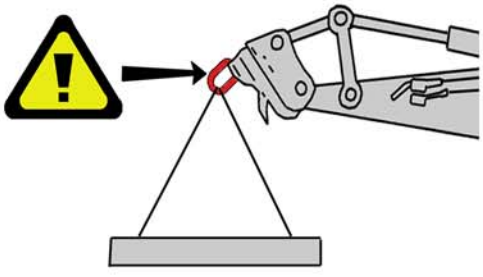
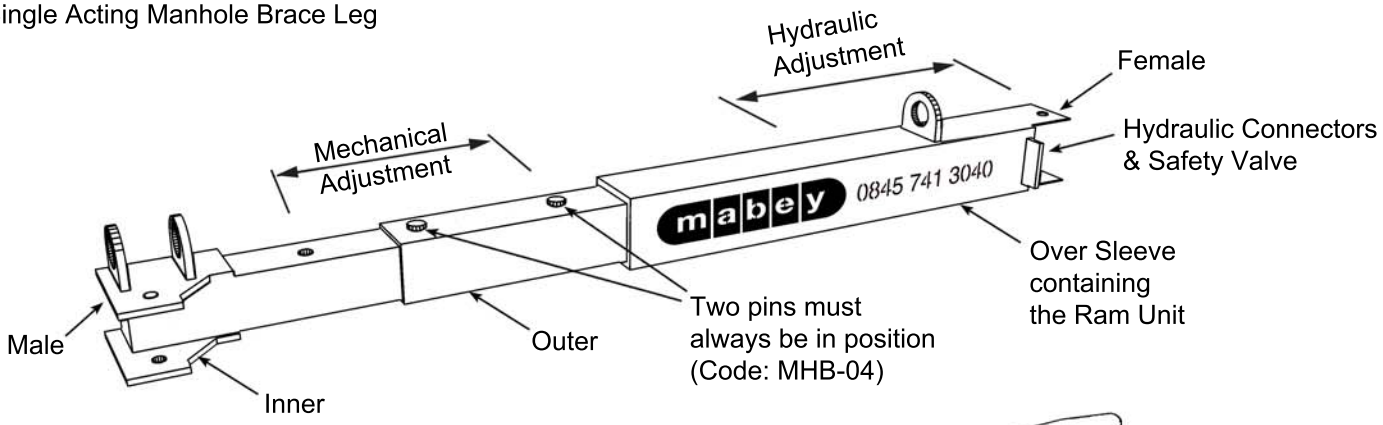
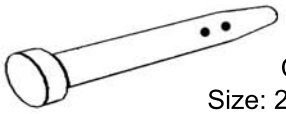


INCORRECT

7. Identification of Components

Single Acting Manhole Brace Leg





Pin
Code: MHB-04
Size: 20 dia x 220mm Long
Weight: 0.6 Kg

Leg Type	Leg Code	Mechanical Adjustment Position	Clear Internal Dimension		Pin to Pin Dimension (mm)		Dimension Over Frame		Leg Weight (Kg)	SWL on Leg in kN/m run - Ram fully extended (FOS=2)
			Minimum (Ram Closed) (mm)	Maximum (Ram Extended) (mm)	Min.	Max.	Minimum (Ram Closed) (mm)	Maximum (Ram Extended) (mm)		
00	MHBL-D	Minimum	1270	1630	1340	1700	1550	1910	78	35.0
		Maximum	1470	1830	1540	1900	1750	2110		28.0
		Minimum	1470	1830	1540	1900	1750	2110		28.0
0	MHBL-A	Medium	1670	2030	1740	2100	1950	2310	101	23.0
		Maximum	1870	2230	1940	2300	2150	2510		19.0
		Minimum	2070	2430	2140	2500	2360	2720		16.0
1	MHBL-B	Medium	2370	2730	2440	2800	2660	3020	119	13.0
		Maximum	2670	3030	2740	3100	2960	3320		10.5
		Minimum	2970	3330	3030	3390	3300	3660		19.0
2	MHBL-C	Medium	3270	3630	3330	3690	3600	3960	178	13.5
		Maximum	3570	3930	3630	3990	3900	4260		8.5

7.1 Accessories

- Installation Kit (Code MHB-IKIT) consisting of: Single Acting Pump, Code: PSP-100, Weight: 18 kg empty, 43 kg full. Hose Extensions, Code: PSP-275. Mabey Shoring Fluid, Code: PSP-160[S].
- Lifting Chain, Code : PSP-155/SH or PSP-155, Weight : 24 Kg, 7mm 4 leg chain sling with 4m leg length. Refer to Lifting Chain User Information for further details.
- Restraint Chain, Code : TB-07, Length : 2m, Weight : 4.0 Kg, Capacity 500Kg.

8. Stacking and Handling

- Suitable firm level dry areas should be made available on site for stacking and pre-assembly work.
- Suitable lifting equipment of adequate capacity should be provided for off-loading, pre-assembly of frames, installation and dismantling.
- Slinging should always be carried out by suitably experienced and competent personnel. Weights of legs can be obtained from section 7.

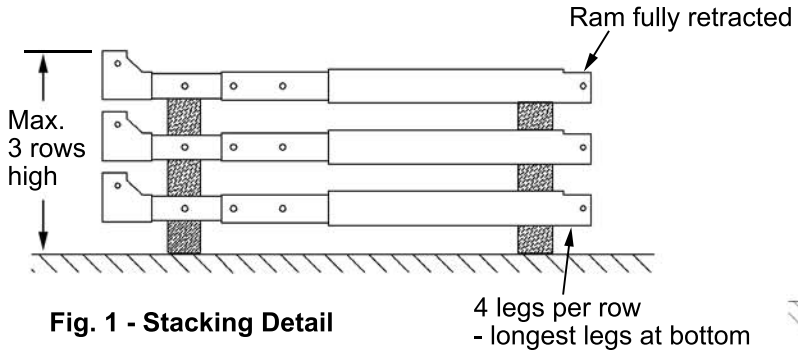
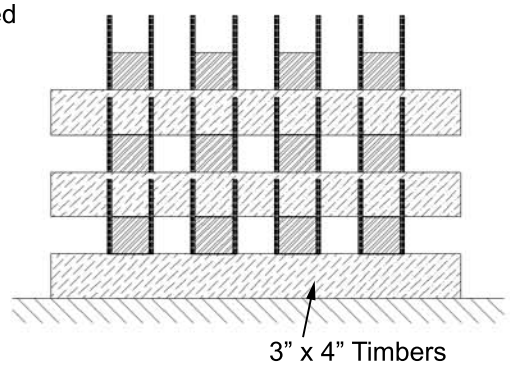
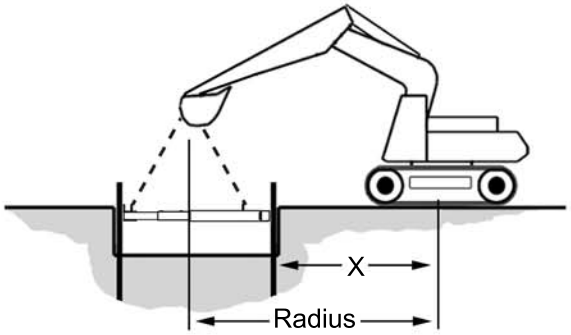


Fig. 1 - Stacking Detail



9. Typical Waling Assembly and Site Connection Details

9.1 Excavator Lifting Requirements



X = dimension from rear face of excavation to centre line of excavator / crane when standing at a safe distance from the excavation.

Max Lift = Frame weight + weight of chains (see page 5).
Radius = ½ width of frame + x

Refer to excavator manufacturer for machine load capacity.

9.2 Frame Assembly

Set the individual leg lengths to the required range by means of the two coarse adjustment pins (see fig.2).

The range should be chosen so that, with the ram fully closed, the leg is not more than 300mm less than the required excavation width inside the sheeting. With all legs set in this way, place the legs on firm level ground and connect the corners using the pins and clips supplied. The frame is now ready for installation. Make up as many frames as possible in advance of excavation to ensure that they are ready as required during digging.

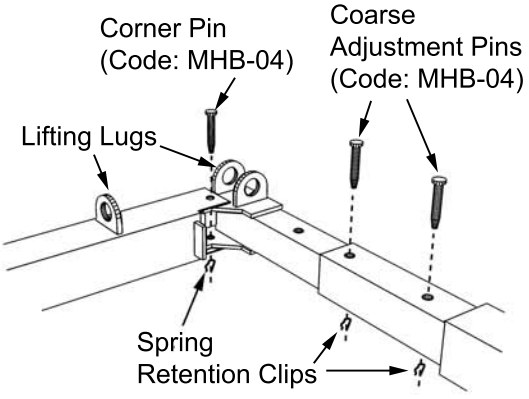
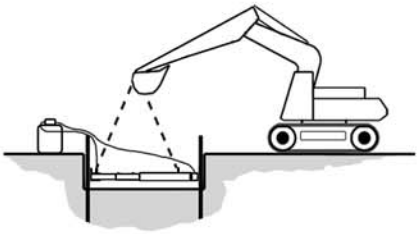


Fig. 2 - Corner Connection

10. Typical Sequence of Sheet and Frame Installation

WARNING : Refer to safety information on page 4 regarding excavators being used for lifting operations.

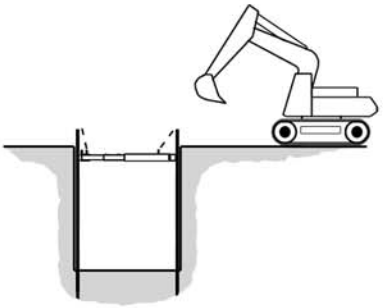
10.1. Assemble frame securing all pins, setting the pins to suit the excavation size. Two pins must always be in position on each leg in addition to the corner pin (see fig 2). Set rail length to approx. 150mm less than distance between sheets.



10.2. Place the sheets and drive as far as possible.

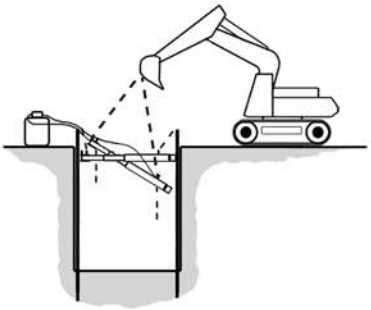
10.3. Dig to depth of first frame. Attach 4 way sling to lifting eyes and lift in frame complete with linking chains and hose. Chock the corners with timber wedges if required.

10.4. Pump out the frame and pressurize until gauge reads 1500 p.s.i. Close the ram lock-off valve and connect the restraint chains to top of the sheets, release the pressure at pump end and disconnect hoses and the slings.

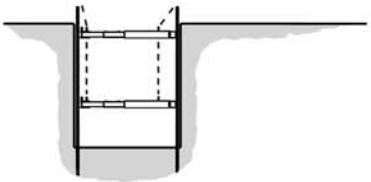


10.5. Excavate through the first frame to the second frame position, keeping a min sheet "toe-in" of 0.5m. The sheets holding the restraint chains are to be left high until the other sheets are driven. Re-locate the restraint chains on to the driven sheets and drive the high sheets to the correct level.

10.6. Lift the second frame complete with restraint chains and hoses and pass through the first frame to the second frame level. Pump out the frame and pressurize until the gauge reads 1500 p.s.i. Close the ram lock-off valve and connect the restraint chains between frames, release the pressure at the pump end and disconnect hoses and sling.



NOTE: If second frame cannot be passed through first frame, the individual legs of second frame will have to be placed in position and assembled in excavation.
(Safe working must be maintained at all times).



10.7. Push the sheets down to give "toe-in" required and complete the dig.

NOTE : 1. This method requires operatives working in the excavation and the contractor must ensure safe working conditions at all times.
2. See Page 8 for notes on use of restraint chains.

11. Removal of Frames

Backfill to the underside of the lowest frame and carry out any compaction required. Ensure frame is securely packed or supported from below. Connect 4 way chain sling. Connect bridle and pressurize system to 1500 p.s.i. Open "lock-off" valves. Pressure may now be gradually released using the pump valve. Remove restraint chains and lift frame from trench. Follow the above procedure for the upper frame.

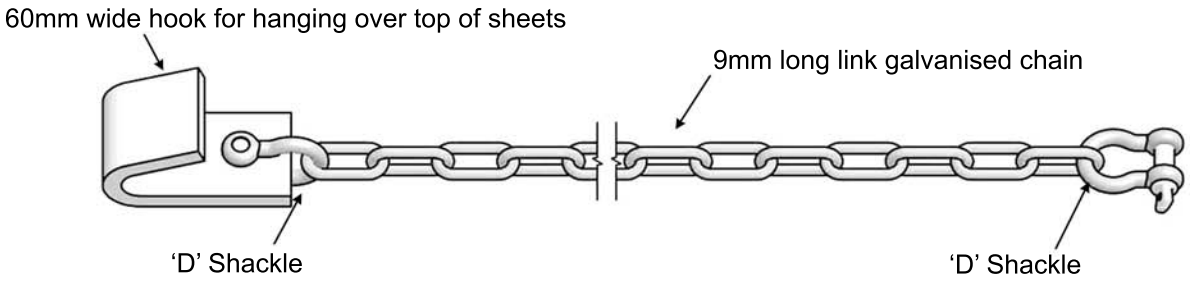
When the frames have been removed and the excavation backfilled, the sheets can be removed, one at a time using a trench sheet extractor.

12. Use of Restraint Chains (TB-07) Capacity 500 kg

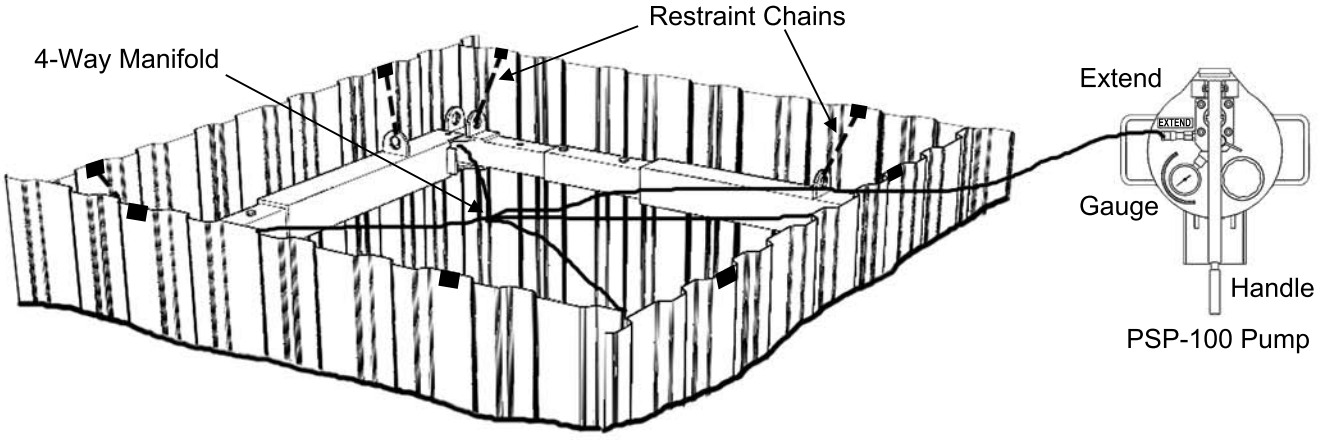
Restraint chains are provided as a back-up support arrangement in the unlikely event of hydraulic failure of one of the Single Acting Manhole Brace hydraulic legs. They are **NOT** to be used for any other purpose and particularly, are **NOT** to be used as lifting chains. They are **NOT** intended as a means of suspension to be relied upon during installation or removal of the frames.

Always ensure all the restraint chains are fitted as per arrangement shown on the scheme drawing, or if no scheme has been prepared 1 No. chain every 2.5 m approx of waling. Remove as much slack as possible from the chain by repositioning the lower 'D' shackle.

Users must ensure that frames are securely supported by means other than the restraint chains prior to depressurizing the frames.



13. Mechanical Pump Connection and Use



Pressurize all four rams to 1500 p.s.i. Close lock-off valves, release pressure at the pump and disconnect the hoses.

Shorter sheets may be used at the corners to provide bucket access if the sheets require the dig and drive method.

13.1 Mabey Hire Shoring Fluid

The pump is normally supplied with a full tank of pre-mixed fluid. If the fluid is separately supplied "neat" in 5 litre orange coloured containers, it should be poured into the pump and cold clean water added according to prevailing temperature conditions. (See table right). Protective gloves should always be worn when handling shoring fluid.

NOTE : A Shoring Fluid safety data sheet is available from Mabey Hire Limited.

Temp Range (C)	Shoring Fluid (litres)	Water (litres)
Above 0	5	20
-6 to 0	10	20
-10 to -7	15	15
-10 and below	Neat fluid only	

14. Points to Watch

14.1 Over Extension of Rams

If the maximum extension of the ram is passed fluid will discharge from a small safety vent and it will not be possible to achieve the working pressure. To retract the ram into its correct working range, release all pressure at the pump, and close the rams down by hand.

14.2 Air in the System

Occasionally air may get into the system causing either springiness in the ram or a lack of prime in the pump.If this occurs the following steps should be taken:

14.2.1 To restore prime to the pump, disconnect the handle from the piston rod by undoing the wing nuts and removing the pin, open the pump valve, fold the handle over the front of the pump and manually work the piston rod up and down as fast as possible. When prime is restored, a considerable increase in resistance will be felt. The handle can now be reconnected and normal pumping continued.

14.2.2 To ensure that the ram is air free:

- PURGE AIR FROM THE HOSES: Either connect the hose end to the male coupler on the bucket top, if it is of that type, or depress the nipple in the hose end, and in both cases pump until fluid flows freely through the hose, THEN
- PURGE AIR FROM THE RAM: Attach the purged hose to the ram and fully extend. Stand the ram on end with the valve block at the top. Release the pressure at the pump valve and push the ram closed. All air should now be purged.

15. Do's and Don'ts

DO... make sure lifting equipment and plant of adequate capacity are available for assembly and installation.
DO... ensure that two coarse adjustment pins are fitted to each leg.
DO... ensure that all pin retaining clips are in position before the frame is installed.
DO... pump from outside the excavation - use extension hoses for lower frames.
DO... ensure that pressure is being held in rams before closing lock-off valves.
DO... ensure that restraint chains are used between each frame as well as onto the top of the sheets. Where frames are doubled for deeper excavations, it will be necessary to wrap the chains around the lower frame rather than using the lifting eye.
DO... allow sufficient working space around a manhole for a man to get down and re-connect the hoses to remove the lower frames.
DO... ensure that all lock-off valves are open (max. 2 turns) prior to pumping and that all hose/ram connections are clean.

DO NOT... attempt to remove any pins while the frame is under pressure.
DO NOT... release pressure by depressing or tapping the connector nipple.
DO NOT... leave a gap between the sheets at the corners.
DO NOT... enter the excavation until pressure is held in the rams.
DO NOT... lift a frame until the pressure has been released.
DO NOT... attempt to disconnect a hose until the lock-off valve has been fully closed, and pressure has been released at the pump.
DO NOT... use restraint chains as a means of suspension during frame installation or removal or for any other purposes other than described above. In particular DO NOT use for lifting purposes.

16. General

Since our policy is one of continual improvement, components may vary in detail from the descriptions given in this publication.

User Information Appendix A : Provision of a Mabey Hire Site Demonstrator

Mabey Hire can, subject to availability, offer the services of a Site Demonstrator.
However, the Customer should note the following :-

A1. The Customers Responsibilities

A safe system of work remains the Customers responsibility at all times. It is his responsibility to prepare for, organise and direct the operation including :-

A1.1 Site induction for the demonstrator.

A1.2 Preparation of a method statement.

A1.3 A risk assessment.

A1.4 Selection of lifting equipment and any other equipment required to undertake the work.

A1.5 Positioning of the crane or lifting appliance.

A1.6 Banking the crane.

A1.7 Slinging the components.

A1.8 Assembling the components and installing them.

A2. Activities which the Mabey Hire Demonstrator is authorised to carry out

Mabey Hire Demonstrator is authorised to :-

A2.1 Assist in indentification of Mabey Hire components.

A2.2 Explain how they fasten together.

A2.3 Point out slinging points and special methods of lifting as noted in the user information.

A2.4 Demonstrate how to attach hoses and use pumps to extend/retract hydraulic braces.

A2.5 Draw attention to the content of the user information.

A2.6 Clarify queries with Mabey Hire scheme drawings.

The Demonstrator is NOT AUTHORISED to ‘take over’ or direct the installation.

To : Mabey Hire Limited
(Please return this completed form to the Mabey Hire depot supplying the equipment. Contact details for all the Mabey Hire depots are available both on-line at www.mabeyhire.co.uk/depot-directions/ and within our brochures)

From (Company Name) _____ Site (Address) _____

_____

Tel.No._____ Fax No. _____ _____

Re : Provision of a Mabey Hire Demonstrator on site

We confirm receipt of your User Information Appendix A - and that we would like to request the services of your Demonstrator on the following date(s) _____

Signed _____ Name (print) _____ Date _____